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ANTIDIABETIC ACTIVITY OF STEM EXTRACTS OF PLANT MORINGA OLIEFERA

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ABSTRACT

Since ancient time many medicinal plants are used in traditional system of medicine to treat diabetes. Most of these medicinal plants were found to be hypoglycemic activity. *Moringa oleifera* Lam. (Moringaceae) is used in treatment of various ailments including diabetes. We still lack scientific evidence in this concern. Hence present study was designed to investigate hypoglycemic activity of alcoholic and hydroalcoholic extract of stem of *M. oleifera* in *Swiss albino* mice using OGTT assay. Both extracts were administered at the dose of 200 mg/kg p.o. Blood glucose level was monitored for next 4 hours after glucose loading (2 gm/kg) with interval of 1 hour. Both extract decrease blood glucose level significantly . Thus from present study it can be concluded that alcoholic and hydroalcoholic extract of *M. oleifera* possess significant hypoglycemic activity.

KEY WORDS: *Moringa oleifera, Hypoglycemic, OGTT.*

Introduction

Among various epidemic diseases in India, diabetes is one of the most important one with higher than 62 million diabetic patients (Joshi and Parikh. 2007.) India is having maximum number diabetic patients followed by China and America. In 2000 171 million diabetic patients were estimated in world and it is predicted that in 2030 it will reach up to 366 million patients, with 79.4 million diabetic patients in India (Wild et al., 2004). Neuropathy, cardiovascular complications, renal issues, retinopathy and foot ulcers are some of the common ailments associated with diabetes (Ramachandran et al., 2001). Since ancient time many medicinal plants are used in traditional system of medicine, local dwellers and vaidyas in India to treat diabetes. Moringa oleifera is one of the widely used medicinal plants for diabetes. Over the last two decades, lots of information has appeared in mainstream scientific journals unfolding its nutritional and medicinal value.

Moringa oleifera is the most broadly cultivated species of a monogeneric family, the Moringaceae, which is native to the sub-Himalayan tracts of India, Pakistan, Bangladesh and Afghanistan. specific components of Moringa preparations that have been reported to have hypo-tensive, anticancer, and antibacterial activity include 4-(4'-O-acetyl-α-L-rhamnopyranosyloxy) benzyl isothiocy-anate (Abrams et al., 1993), 4-(α-L-rhamnopyranosyloxy) benzyl isothiocy-anate (Abuye et al., 1999), niazimicin (Akhtar and Ahmad., 1995), pterygospermin (Anderson and Bell, 1986)., benzyl isothiocyanate (Anwar and Bhanger., 2003), 4-(α-L-rhamnopyranosyloxy) benzyl glucosinolate (Asres, 1995), carotenoids (including β-carotene or pro-vitamin A) and a number of vitamins and minerals. Various parts of this plant such as the leaves, roots, seed, bark, fruit, flowers and immature pods act as cardiac and circulatory stimulants, possess antitumor, antipyretic, antiepileptic, antiinflammatory, antiulcer, antispasmodic, diuretic, antihypertensive, cholesterol lowering, antioxidant, antidiabetic, hepatoprotective activity (Anwar et al., 2007). No study was available for the effect of stem extract of M. oleifera as hypoglycemic agent. Hence present study was designed to investigate hypoglycemic activity of extracts from stem of M. oleifera.

Materials and Methods

Plant material and extraction

Stem of Moringa oleifera were collected from the local surroundings at Bhopal city of M.P, during the month of November to December. Extraction was performed using continuous hot percolation 'Soxhlation'. Extraction was performed at 40oC using petroleum ether as non polor solvent at first. Exhausted plant material was dried and afterward was extracted with methanol and Hydroalcoholic solvent. Obtained extracts were evaporated using rotary vacuum evaporator (Buchi type) at 40oC.

Animals and experiment design

Swiss albino mice were obtained from the animal house of Pinnacle Biomedical Research Institute (PBRI) Bhopal. Animals were housed in a group of four in separate cages under controlled conditions of temperature (22 ± 2°C). All animals were given standard diet and water regularly. All animal experiments were approved by Institutional Animal Ethics Comitte of PBRI prior to experiments.

Animals were randomly divided in four groups with six animals in each group. Induction of diabetes in mice was done by injecting glucose intraperitoneally. Blood glucose levels have been determined by OGTT. Group I to Group VI was selected for OGT test after starving at water for 16 hours. The baseline glucose level was measured by glucometer (Accu - chek glucometer). Group I stands for normal control group. Group II stands for glucose control group. In Group III and IV alcoholic and hydroalcoholic extract of M. oleifera was administered at 200 mg/kg, p.o. Water was used as vehicle for present study. Serum glucose of blood sample from tail vein was estimated by using glucometer at 0, 60, 120 and 240 minutes.

Biostatical interpretation

All data were analyzed using One Way ANOVA followed by Benferoni's t test. $P<0.05$ was considered as level of significance for present experiment.

Results and Discussion

Results revealed that although both the extracts show promising antidiabetic activities, hydroalcoholic extract showed better antidiabetic activity than alcoholic extract (Table 1). The oral glucose tolerance test (OGTT) has been the mainstay for diagnosing diabetes for decades (Bartoli et al., 2011). Since impaired oral glucose tolerance (IGT) is indicative of a predisposition of an animal to diabetes, agents that exhibit anti hyperglycaemic effect capable of bringing blood glucose concentration within normal limits will help to arrest the progression of impaired glucose tolerance to diabetes. Blood glucose level was observed at 1 hour interval till 4th hour. It was observed in glucose control group, significantly high level of blood glucose level was present ($P<0.05$) as compared to vehicle treated animals (Table 1). This confirmed hyperglycemic condition. In extract treated significant decline in blood glucose level was observed ($P<0.05$). Both extracts were found to significantly effect in declining blood glucose level, but hydroalcoholic extract was found to be more effective as compared to alcoholic group. Particularly on 4th day difference was significant ($P<0.05$) between these groups (Table 1). Thus from present study it can be concluded that M. oleifera possess significant hypoglycemic potential and it can be future candidate for development of antidiabetic agent.

Table 1: Hypoglycemic effect of Moringa oleifera extract

S. No.	Treatment	Blood Glucose level (mg/dL)#				
		Dose	0 Hrs	1 Hrs	2 Hrs	4 Hrs
1	Vehicle	-	71.1±2.934	71.3±3.194	71.5±3.088	72.3±2.944
2	Glucose control	2 g/kg	71.9±3.039	153.8±5.763	204.9±8.865	174.3±9.360
3	Alcoholic extract	200 mg/ kg	71.7±4.743	162.8±5.674*	158.7±5.839*	144.7±6.103*
4	Hydroalcoholic extract	200 mg/ kg	73.2±4.579	158.6±6.677*	134.6±5.864*	90.6±6.405*

All data presented in Mean ± SD (N=6)

* $P<0.05$ as compared to glucose control group.

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